USEPA Comments on the April 2001 Performance Standards Verification Plan (PSVP)

1. *Response 2, VW-3: In its May, 31, 2001 letter to USEPA, WMI agreed to monitor VW-3, but only "through the initial Five-Year Review." Although USEPA agrees with monitoring VW-3, monitoring only through the initial Five-Year Review does not meet the requirement for the Site's groundwater monitoring program, described in 35 IAC 811.319(a). Furthermore, monitoring only through the initial Five-Year Review does not honor the intent of USEPA's May 11, 2001 letter to WMI that allowed monitoring VW-3 "as part of the groundwater monitoring network."*

   According to 35 IAC 311.819(a)(1)(D), WMI may petition for a reduced monitoring period if it can show "that the reduced period is sufficient to protect human health and the environment." Therefore, USEPA may reduce the monitoring period for VW-3 or other groundwater monitoring wells if the aforementioned condition is met. However, USEPA will not reduce the monitoring period until this condition is met.

   Please include VW-3 in the documentation of the groundwater monitoring network, including Figure 3-1 of the FSAP, and in other parts of the O&M Plan, FSAP, and PSVP, as appropriate. The documentation should also include the requirement in the May 11, 2001 letter that VW-3 be monitored during stagnant groundwater conditions (to be determined by USEPA after receiving a proposal of an appropriate period of well downtime from WMI).

   Response: VW-3 has been incorporated into the groundwater monitoring network for the site. Specifically, references to monitoring of VW-3 has been added to the Field Sampling and Analysis Plan (Figure 3-1, Tables 3-1 through 3-3, and Subsections 3.1.3 and 4.4.1), the Quality Assurance Project Plan (Tables 1-3 and 1-6), and the PSVP (Subsection 2.1.1). VW-3 will be sampled as part of the long-term groundwater monitoring program for the site. WMI will coordinate sampling of VW-3 to coincide with the well pumping schedule implemented by the Village of Antioch. The well will be sampled following VW-3's nonpumping period in the overall well pumping schedule. Specific access to, and the sampling of, VW-3 is subject to authorization by the Village of Antioch and must be coordinated with them.

   Also in the May 31, 2001 letter, WMI states that it "will summarize all of the information in its possession regarding other potential sources of contamination within the capture zones of VW-3 and submit it to USEPA for incorporation in the administrative record."

The USEPA will review any additional documents submitted by WMI and add the documents to the Site administrative record, if the documents, either partially or wholly, "form the basis for selection of a response action." The quoted criterion is from the December 3, 1990 OSWER Directive 9833.3A-1, "Final Guidance on Administrative Records for Selecting CERCLA Response Actions."

Response: Comment noted. WMI will provide the USEPA with documentation on potential sources of contamination in the Sequoit Acres Industrial Park.

2. *Response 4, PZ6U: In Figure 3-1 of the Field Sampling and Analysis Plan, change "P75U" and "P76U" in the fourth column of the table to "PZ5U" and "PZ6U," respectively.*

Response: The callouts for the two wells have been corrected in Figure 3-1 of the FSAP as noted above.

3. *Response 7, W6S and US6S: The USEPA requires that W6S and US6S be included in the long-term monitoring program. W6S will provide data from the upper portion of the shallow aquifer, and US6S will provide data from a lower portion of the shallow aquifer. Since the premise is that the shallow groundwater discharges to Sequoit Creek, both wells will forewarn of any contamination that may be discharged to the creek.*

Response: US6S has been incorporated into the long-term monitoring program as a well location for both water level measurement and groundwater sampling. Specifically, reference to US6S has been added to or modified in the Field Sampling and Analysis Plan (Figure 3-1, Tables 3-1 through 3-3, and Subsections 3.1.3 and 4.4.1), the Quality Assurance Project Plan (Tables 1-3 and 1-6), and the PSVP (Subsection 2.1.1).

4. *Response 8, G102 and US4S: Although G102 and US4S are screened at the same depth, they have encountered different contaminants. G102 has encountered vinyl chloride, and US4S has encountered DCE (total). By removing either of these wells from long-term monitoring, it is possible that off-site, contaminant migration in the surficial aquifer could be missed in the future, or that conclusions of whether monitored natural attenuation (as part of the selected remedy) is occurring could be based on insufficient data. Therefore, USEPA requires that both wells be included in the long-term monitoring program.*

Response: G102 will not be abandoned and has been incorporated into the long-term monitoring program as a well location for both water level measurement and groundwater sampling. Specifically, reference to G102 has been added to or modified in the Field Sampling and Analysis Plan (Figure 3-1, Tables 3-1 through 3-3, and

Subsections 3.1.3 and 4.4.1), the Quality Assurance Project Plan (Tables 1-3 and 1-6), and the PSVP (Subsection 2.1.1).

5. *Response 11, Table 2-1: Although WMI agreed to add sulfide to the list of MNA Monitoring Plan Parameters, the revised page of Table 2-1 of the PSVP was omitted.*

Response: Sulfide is included in Table 2-1 of the final PSVP. This table was inadvertently left out of the April 2001 response submittal.

6. *Response 13, Table 2-2: Please provide further justification for including the 1.3 µg/l mercury water quality standard for protection of aquatic organisms instead of the 0.012 µg/l human health standard.*

Response: As previously noted in the April 2001 response to the March 2001 USEPA comment on this subject, the human health criterion/standard for mercury in surface water is primarily based on the consumption of fish. According to USEPA studies on water quality criteria for mercury (1980, 1985, 1996, 1999), drinking mercury contaminated water contributes approximately 1 percent of the assumed exposure, while eating contaminated fish accounts for 99 percent of the exposure. The Illinois EPA utilized the 1985 USEPA mercury study to develop their human health surface water standard for mercury contained in 35 IAC 302.208 (Olson 2001). USEPA (1985) established the 0.012 µg/L mercury water quality standard based on the consumption of game fish with the Food and Drug Administration's recommended limit of 1 mg/kg mercury in fish flesh. It should be noted that the USEPA has since revised upward their human health mercury water quality standard (USEPA 1996, 1999), but the Illinois EPA has not adjusted their standards to reflect these changes.

Mercury was not identified as a Chemical of Concern (COC) for the H.O.D. Landfill Site (USEPA Record of Decision 1998) based on Remedial Investigation activities and the Baseline Risk Assessment (Baseline RA). The Baseline RA (ICF Kaiser, 1994) for H.O.D. Landfill states that "Surface water in Sequoit Creek is shallow and intermittent and would therefore not be suitable for swimming, thus incidental ingestion of surface water is not a viable pathway." In the same sense, the nature of Sequoit Creek does not make it a fishery and thus ingestion of fresh-water game fish from the Creek is also not a viable pathway. Furthermore, Table 10 of the ROD, which summarizes the Baseline RA, shows that dermal contact with surface water by a child/trespasser has a hazard index of 0.03. This is well below the value of one, where noncarcinogenic risks are considered significant. Since the consumption of Sequoit Creek water has been ruled out as a pathway and, more importantly, Sequoit Creek is not a fishery, the surface water standard for mercury has been based on the protection of aquatic organisms.

35 IAC 302.208 has both chronic (1.3 µg/L) and acute (2.6 µg/L) surface water mercury standards for the protection of aquatic organisms. The more conservative chronic standard of 1.3 µg/L has been included in Table 2-2 of the PSVP for mercury.

7. *Section 7.1, Quarterly Reports: Insert the following wording: "If the analytical data from a sampling event indicate that the performance standards used to determine the effectiveness of the remedy have been exceeded, USEPA and Illinois EPA will be notified in writing of the exceedance as soon as the exceedance has been recognized, but no later than within 45 days of the sampling event."*

   Response: The suggested wording has been inserted after the first sentence of Subsection 7.1.

8. *Response 14, Section 8.3.2: This section describes only additional sampling requirements if it is determined that the surface water is impacted by the landfill. If such as determination is made, please add a contingency for remedial action.*

   Response: The following text has been added immediately before the last sentence of Subsection 8.3.2:

   > If, after the additional monitoring and evaluation, it is determined that surface water is being negatively impacted by leachate from the H.O.D. Landfill, an evaluation will be made as to whether other response action (e.g., lowering of leachate extraction pumps in the vicinity, additional extraction points, monitored natural attenuation, etc.) would be appropriate.

9. *Table 2-6: Although WMI agreed to add historical water level elevations to this table, the revised table was omitted.*

   Response: The revisions to Table 2-6 were inadvertently left out of the April 2001 submittal. Historical water level elevations are included in Table 2-6 of the final PSVP.

10. *Response 16, Section 6.3.2, Leachate Collection: To meet the requirements of the ROD and UAO SOW, the inward gradient must be established for the limits of the landfill where the shallow sand and gravel aquifer exists. Therefore, to determine whether an inward gradient has been achieved by the leachate collection system, water elevation data at least must be collected from eastern, western, and southern perimeter wells within the landfill. For the inward gradient determination, the landfill in this latest submission is divided into two separate units, the "Old Landfill" and the "New Landfill." No rationale has been provided for such separation. For the performance criteria, the landfill is considered as one unit, not two separate units with separate performance criteria.*

Replace the phrase, "For the 'Old Landfill," if the liquid levels in each of GW26, GW27 and GW28 are below the average groundwater level in W5S and W6S, then inward gradients have been met. For the "New Landfill," if the liquid levels in each of GW22, GW23 and GW25 are below the average groundwater level in PZ3U and PZ(4)U, then inward gradients have been met." with the following:

> *"For the landfill, if the liquid levels in each of GWF5, GW20, GW21, GW22, GW23, GW24, GW25, GW26, GW27, GW28, GW29, GW30, LP-10, LP-3, and LP-1 are below the average groundwater level in W5S, W6S, PZ3U, PZ4U, and PZ5U, then inward gradients to the landfill in the area of the shallow sand and gravel aquifer have been met."*

Response: The existing language referenced has been replaced with the new suggested language above in its entirety.

11. *Response 18, Section 6.3.2: Replace the phrase "risk demonstration" with "risk assessment" to be consistent with USEPA terminology.*

Response: The text in the first bullet in Subsection 6.3.2 has been modified as suggested above.

12. *Response 20, Section 8.6.1: Replace the phrase "a barrier layer to the infiltration of precipitation into the waste mass" with "a low permeable layer to reduce infiltration of precipitation into the waste mass."*

Response: The referenced phrase has been changed to read "a low-permeability layer to reduce infiltration of precipitation into the waste mass,".

13. *Section 8.3.2, Determination of Need for Contingent Actions: In the last sentence, add "or need for corrective action" between words "exceedance" and "will."*

Response: The suggested text revision has been incorporated.

14. *Section 8.4.2.3, Inward Gradient Performance Standard: The last sentence of this section is missing some words. Please clarify this sentence.*

Response: The sentence has been changed to read "Any necessary modifications to the leachate extraction system deemed necessary, based on the evaluation, will be determined in consultation with the USEPA."

References

ICF Kaiser (August 1994). Baseline Risk Assessment for the H.O.D. Landfill Site, Antioch, Illinois.

Olson, C. (August 2001). Personal telephone conversation with Jim Tinjum of RMT. August 8, 2001.

USEPA (October 1980). Ambient Water Quality Criteria for Mercury. EPA 440/5-80-058.

USEPA (January 1985). Ambient Water Criteria for Mercury - 1984. EPA 440/5-84-026.

USEPA (September 1996). 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water.

USEPA (April 1999). National Recommended Water Quality Criteria - Correction. EPA 822-Z-99-001.

Section 1
Introduction

This Performance Standards Verification Plan (PSVP) has been prepared by RMT, Inc. (RMT), on behalf of Waste Management of Illinois, Inc. (WMII). This PSVP is specific to the long-term monitoring program at the H.O.D. Landfill site in Antioch, Illinois.

The purpose of this PSVP is to provide documentation of the following:

- Monitoring tasks and applicable compliance standards
- Data collection requirements (analytes, sampling locations and frequency, sampling methods)
- Quality assurance and quality control requirements
- Reporting requirements
- Procedures for changing the monitoring program
- Procedures for verification sampling if applicable standards are exceeded
- Criteria that will be used to determine achievement of remediation objectives and the need for implementation of contingent actions

Included as appendices to, and referenced throughout, this PSVP are the Field Sampling and Analysis Plan (FSAP), the Quality Assurance Project Plan (QAPP), and the Health and Safety Plan for the Predesign Investigation ~~Remedial Action Construction~~ (HSP).

Section 2
Description of Monitoring Tasks

The Remedial Design Report (RD Report; RMT, 2000) presents the long-term environmental monitoring plan for the H.O.D. Landfill. The environmental monitoring plan for the site is included as Figure 3-1 of the FSAP. The following subsections describe the specific tasks associated with the long-term environmental monitoring plan.

2.1 Groundwater Monitoring

2.1.1 Groundwater Sampling

The selected remedy for groundwater, as stated in Section IX (page 55) of the ROD, is monitored natural attenuation (MNA). As part of the remedy, groundwater will be monitored for the list of constituents in Table 2-1 (Table 22 of the ROD and 35 IAC 620.410) in the set of monitoring wells presented on the environmental monitoring plan (Figure 3-1 of the FSAP). The applicable standards for groundwater are the Illinois Pollution Control Board Groundwater Quality Standards for inorganic and organic constituents (Table 2-1). In addition, an MNA groundwater monitoring plan that is designed to assess the effectiveness of natural attenuation will be implemented. As specified in OSWER Directive 9200.4-17P, this MNA monitoring plan is designed to provide the information necessary to evaluate whether the remedy is performing as expected and is capable of attaining the remediation objectives (USEPA, 1999a). The analytes that are included in the MNA monitoring plan are listed in Table 2-1.

The monitoring wells selected for groundwater sampling and groundwater level measurement, shown in Table 3-3 and on Figure 3-1 of the FSAP, were chosen on the basis of hydrostratigraphy and their up- or downgradient position relative to the site. Previous investigations found two aquifers in the vicinity of the site separated by an aquitard. Both aquifers will be monitored. On the basis of the results of the groundwater Predesign Investigation (PDI) (RMT, 2000a), it is likely that groundwater in the surficial sand aquifer discharges to Sequoit Creek, which is located along the southern and western edges of the landfill. For groundwater sampling purposes, PZ4U, PZ3U, W6S, US6S, G102, and US4S are located on-site and in a downgradient position on the closed landfill property. While W6S and US6S are located in lateral proximity, W6S will provide data from the upper portion of the shallow aquifer, and US6S will provide data from a lower portion of the shallow aquifer.

Monitoring these six ~~four~~ wells will provide a means of detecting any on-site migration of inorganic and/or organic constituents in the surficial sand aquifer.

Groundwater flow in the deep sand and gravel aquifer (DSGA) is influenced by the Village of Antioch municipal well pumping schedule; however, net groundwater flow is southward (RMT, 2000a). Therefore, US5D was chosen as an upgradient monitoring point for use in defining background levels of analytes. Wells W8D, US6D, and US4D are located on-site and in a downgradient position on the closed landfill property; while US3D, US1D, W3D, US2D, and R1D are located in a downgradient position of the closed landfill beyond the landfill property limits. VW-3 was chosen as a generic receptor in the DSGA in the area of the Sequoit Acres Industrial Park. While the net groundwater flow is to the south and not to the west (RMT, 2000a), VW-3 will be used as a lateral monitoring well and to assess if a contamination plume reaches this withdrawal location. US3D, which is the only monitoring well screened in the DSGA where organic contaminants of concern have been detected, is the primary point of compliance. US2D and R1D are located south of US3D and, along with US3D, form an approximate linear downgradient monitoring network of wells screened in the DSGA.

2.1.2 Groundwater Level Measurement

Water levels will be measured in a subset of the monitoring wells in order to assess the direction of groundwater flow at the time that groundwater samples are collected. The procedures that will be used to collect groundwater level measurements are fully described in Subsection 4.8.2 of the FSAP. The groundwater sampling and analyses for the complete list of analytes described above and the groundwater level measurements will hereafter be collectively referred to as the long-term groundwater monitoring program.

2.2 Surface Water Monitoring

The surface water monitoring program is designed to assess compliance with the chemical-specific, surface water standards specified in Table 11 of the ROD and presented in Table 2-2. The chemical-specific ARARs found in 35 IAC 302.202-302.212 are general use water quality standards that must be met in waters of the state for which there is no specific designation. The other potential chemical-specific ARARs listed in Table 11 of the ROD apply to pretreatment standards (35 IAC 310.201-220), effluent standards (307.1101-1103, 304.102-126), notice of a discharge of oil (40 CFR 110.6), and notice of discharge of a hazardous substance (40 CFR 117.21). 35 IAC 302.210 and 302.612-669 apply to toxicity criteria (which normally are established primarily in the application process for a National Pollutant Discharge Elimination

Table 2-1
Summary of Applicable Standards for Groundwater

COMPOUND	UNITS	STANDARD[1]
Inorganic Chemical Constituents		
Antimony	mg/L	0.006
Arsenic	mg/L	0.05
Barium	mg/L	2
Beryllium	mg/L	0.004
Boron	mg/L	2
Cadmium	mg/L	0.005
Chloride	mg/L	200
Chromium	mg/L	0.1
Cobalt	mg/L	1
Copper	mg/L	0.65
Cyanide	mg/L	0.2
Fluoride	mg/L	4.0
Iron	mg/L	5
Lead	mg/L	0.0075
Manganese	mg/L	0.15
Mercury	mg/L	0.002
Nickel	mg/L	0.1
Nitrate as N	mg/L	10
Radium-226	pCi/l	20
Radium-228	pCi/l	20
Selenium	mg/L	0.05
Silver	mg/L	0.05
Sulfate	mg/L	400
Thallium	mg/L	0.002
Total dissolved solids (TDS)	mg/L	1,200
Zinc	mg/L	5
Gross-beta[3]	pCi/L	50
Tritium[4]	pCi/L	20,000
Strontium[4]	pCi/L	8

Table 2-1 (Continued)
Summary of Applicable Standards for Groundwater

COMPOUND	UNITS	STANDARD[1]
Organic Chemical Constituents		
Alachlor	mg/L	0.002
Aldicarb	mg/L	0.003
Atrazine	mg/L	0.003
Benzene	mg/L	0.005
Benzo(a)pyrene	mg/L	0.0002
Carbofuran	mg/L	0.04
Carbon tetrachloride	mg/L	0.005
Chlordane	mg/L	0.002
Dalapon	mg/L	0.2
Dichloromethane	mg/L	0.005
Di(2-ethylhexyl)phthalate	mg/L	0.006
Dinoseb	mg/L	0.007
Endothall	mg/L	0.1
Endrin	mg/L	0.002
Ethylene dibromide	mg/L	0.00005
Heptachlor	mg/L	0.0004
Heptachlor epoxide	mg/L	0.0002
Hexachlorocyclopentadiene	mg/L	0.05
Lindane (gamma-hexachlorocyclohexane)	mg/L	0.0002
2,4-D	mg/L	0.07
ortho-Dichlorobenzene	mg/L	0.6
para-Dichlorobenzene	mg/L	0.075
1,2-Dibromo-3-chloropropane	mg/L	0.0002
1,2-Dichloroethane	mg/L	0.005
1,1-Dichloroethene	mg/L	0.007
cis-1,2-Dichloroethene	mg/L	0.07
trans-1,2-Dichloroethene	mg/L	0.1
1,2-Dichloropropane	mg/L	0.005
Ethylbenzene	mg/L	0.7
Methoxychlor	mg/L	0.04
Monochlorobenzene	mg/L	0.1

Table 2-1 (Continued)
Summary of Applicable Standards for Groundwater

COMPOUND	UNITS	STANDARD[1]
Pentachlorophenol	mg/L	0.001
Phenols	mg/L	0.1
Picloram	mg/L	0.5
Polychlorinated biphenyls (PCBs) (as decachloro-biphenyl)	mg/L	0.0005
Simazine	mg/L	0.004
Styrene	mg/L	0.1
2,4,5-TP (silvex)	mg/L	0.05
Tetrachloroethene	mg/L	0.005
Toluene	mg/L	1
Toxaphene	mg/L	0.003
1,1,1-Trichloroethane	mg/L	0.2
1,1,2-Trichloroethane	mg/L	0.005
1,2,4-Trichlorobenzene	mg/L	0.07
Trichloroethene	mg/L	0.005
Vinyl chloride	mg/L	0.002
Xylenes	mg/L	10
MNA Monitoring Plan Parameters		
Total organic carbon	mg/L	NA
Biological oxygen demand	mg/L	NA
Nitrate as nitrogen	mg/L	NA
Nitrite as nitrogen	mg/L	NA
Ammonia as nitrogen	mg/L	NA
Total Kjeldahl nitrogen	mg/L	NA
Orthophosphate	mg/L	NA
Sulfate	mg/L	NA
Sulfide	mg/L	NA
Alkalinity	mg/L	NA
Conductivity[2]	µS/cm	NA
Dissolved oxygen[2]	mg/L	NA
pH[2]	NA	NA
Temperature[2]	°C	NA
Redox potential[2]	mV	NA

Table 2-1 (Continued)
Summary of Applicable Standards for Groundwater

COMPOUND	UNITS	STANDARD[1]
Methane	µg/L	NA
Chloroethane	µg/L	NA
Ethane	µg/L	NA
Ethene	µg/L	NA

Notes:
(1) Table 22 of the ROD, which was derived from 35 IAC 620.410.
(2) Field parameters.
(3) For the purposes of determining compliance with the dose of 4m rem/yr (40 CFR 141.15), the standard is 50 pCi/L (40 CFR 141.25-26)
(4) To be determined only if gross-beta value exceeds 50 pCi/L, per 40 CFR 141.
NA = not applicable.

Table 2-2
Summary of Applicable Standards for Surface Water

COMPOUND OR FIELD PARAMETER	UNITS	STANDARD[1]
Offensive conditions[3]	NA	Water shall be free from sludge or bottom deposits, floating debris, visible oil, odor, plant or algal growth, color or turbidity of other than natural origin
pH[2]	pH units	6.5 – 9.0
Specific conductance	mS/cm	NA
Dissolved oxygen[2]	mg/L	Not less than 6.0 mg/L during at least 16 hours of any 24-hour period, nor less than 5.0 mg/L at any time
Arsenic (total)	µg/L	360
Cadmium (total)	µg/L	exp[A+B ln(H)], but not to exceed 50 µg/L, where A = -2.918 and B = 1.128
Chromium (total hexavalent)	µg/L	16
Chromium (total trivalent)	µg/L	exp[A+B ln(H)], where A = 3.688 and B = 0.8190
Copper (total)	µg/L	exp[A+B ln(H)], where A = -1.464 and B = 0.9422
Cyanide	µg/L	22
Lead (total)	µg/L	exp[A+B ln(H)], where A = -1.301 and B = 1.273
Mercury	µg/L	1.3
Barium (total)	mg/L	5.0
Boron (total)	mg/L	1.0
Chloride (total)	mg/L	500
Fluoride	mg/L	1.4
Iron (dissolved)	mg/L	1.0
Manganese (total)	mg/L	1.0
Nickel (total)	mg/L	1.0
Phenols	mg/L	0.1
Selenium (total)	mg/L	1.0
Silver (total)	mg/L	5.0
Sulfate	mg/L	500

Table 2-2 (Continued)
Summary of Applicable Standards for Surface Water

COMPOUND OR FIELD PARAMETER	UNITS	STANDARD[1]
Total dissolved solids	mg/L	1,000
Zinc (total)	mg/L	1.0
Temperature[2]	°C	The normal daily and seasonal temperature fluctuations that existed before the addition of heat due to other than natural causes will be maintained[5]
Total ammonia nitrogen	mg/L	15
Un-ionized ammonia	mg/L	0.33 from April – October 0.14 from November – March
Hardness (H)	mg/L	No standard, used in establishing standards for selected metals as noted above
1,2-Dichloroethene (total)	mg/L	1.1[4]
Trichloroethene	mg/L	0.94[4]
Vinyl chloride	mg/L	4[4]
Carbon disulfide	µg/L	20[4]

Notes:

(1) Standards are taken from the general use water quality standards (35 IAC 302.202 – 302.212).

(2) Field parameter.

(3) The standard for offensive conditions is qualitative. Exceedences of this standard will be used to infer the cause(s) of exceedences of other applicable standards for surface water.

(4) Normally, a monthly average cannot exceed the standard. However, samples will be collected quarterly. Therefore, annual averages will be compared to the standard.

(5) Temperatures will be recorded, but the standard does not apply as no activity exists that would add heat to surface water bodies.

NA = not applicable.

Table 2-6
Water Level Elevations (feet, A.M.S.L.) at PZ3U, PZ4U, G102, W5S, and W6S During 1992, 1994, and 1995

	1992					1994					1995				
MONTH	**PZ3U**	**PZ4U**	**G102**	**W5S**	**W6S**	**PZ3U**	**PZ4U**	**G102**	**W5S**	**W6S**	**PZ3U**	**PZ4U**	**G102**	**W5S**	**W6S**
JAN	NA	NA	761.66	NA	NA	NM	NM	NM	NM	NM	763.52	763.51	762.33	762.54	763.21
FEB	NA	NA	761.90	NA	NA	762.25	762.47	761.44	761.81	762.03	762.92	763.04	762.11	762.00	762.86
MAR	NA	NA	762.03	NA	NA	NM	NM	762.26	NM	NM	763.02	763.34	762.23	762.09	763.16
APR	NA	NA	762.23	NA	NA	762.57	762.52	761.89	761.90	762.32	761.45	761.52	762.00	762.48	762.84
MAY	NA	NA	761.80	NA	NA	762.52	762.57	761.78	761.82	762.30	761.49	763.07	761.92	762.35	762.43
JUN	NA	NA	761.23	NA	NA	762.48	762.30	761.37	761.46	761.99	761.39	762.10	761.08	761.47	761.32
JUL	NA	NA	761.32	NA	NA	762.28	762.02	761.26	761.37	761.77	761.16	761.24	760.55	760.99	760.98
AUG	NA	NA	761.33	NA	NA	761.42	761.45	761.01	761.11	761.24	760.30	760.42	759.90	759.74	760.91
SEP	NA	NA	762.54	NA	NA	760.98	760.95	760.71	760.81	760.86	760.07	761.05	760.48	760.89	760.78
OCT	NA	NA	762.52	NA	NA	761.17	761.11	760.51	760.88	760.86	760.26	761.33	760.78	761.19	761.34
NOV	NA	NA	762.91	NA	NA	762.09	762.12	761.55	762.00	763.26	762.05	762.39	761.57	762.29	762.01
DEC	NA	NA	763.16	NA	NA	NM	NM	NM	NM	NM	761.70	761.73	761.03	761.81	761.47
Average	---	---	762.05	---	---	761.97	761.95	761.38	761.46	761.85	761.61	762.06	761.33	761.65	761.94
Global Average	761.77														

Notes:
NA = not applicable (wells were installed in 1993).
NM = no measurement.

- A human health and ecological risk ~~demonstration~~ assessment that current and future conditions at the H.O.D. Landfill would be protective of human health and the environment. Supporting data for this assessment shall include statistical trends of leachate quality and migration potential or
- Demonstration that a reduced period is sufficient to protect human health and the environment or
- Petition USEPA for an adjusted standard in accordance with 35 IAC 811.303.

In addition, per 35 IAC 811.309(h)(2), treatment (i.e., leachate collection and disposal at a POTW) will no longer be necessary if the leachate constituents do not exceed the wastewater effluent standards shown in Table 2-3.

Compliance with the performance goal set in the April 1999 Statement of Work (page 5) of achieving inward gradients from the shallow sand aquifer (shown on Figure 17 of the January 1997 RI/FS) in the vicinity of the site will be evaluated by comparing leachate levels within the landfill against the shallow groundwater levels immediately to the south of the landfill unit (W5S, PZ4U, PZ3U, W6S). Shallow aquifer groundwater levels and leachate levels in the landfill will be measured within a 24-hour time frame for evaluation of the inward gradient condition. For the landfill, if the liquid levels in each of GWF5, GW20, GW21, GW22, GW23, GW24, GW25, GW26, GW27, GW28, GW29, GW30, LP-10, LP-3, and LP-1 are below the average groundwater level in W5S, W6S, PZ3U, PZ4U, and PZ5U, then inward gradients to the landfill in the area of the shallow sand and gravel aquifer have been met. ~~For the "Old Landfill," if the liquid levels in each of GW26, GW27, and GW28 are below the average groundwater level in W5S and W6S, then inward gradients to the shallow sand aquifer in the vicinity of the "Old Landfill" have been met. For the "New Landfill," if the liquid levels in each of GW22, GW23, and GW25 are below the average groundwater level in PZ3U and PZU, then inward gradients to the shallow sand aquifer in the vicinity of the "New Landfill" have been met.~~

Section 8 contains a discussion of contingency actions should performance objectives not be met.

6.4 Landfill Gas

Per 35 IAC 811.310(c)(3), upon the installation and operation of an active gas collection system, the LFG monitoring frequency becomes annual. The annual monitoring will be continued until the first Five Year Review period. Monitoring beyond this point will be discontinued assuming the following conditions have been met for at least 1 year:

Section 7
Reporting Requirements

7.1 Quarterly Reports

Quarterly reports will be submitted to the USEPA and the Illinois Environmental Protection Agency (IEPA) within 45 days after the start of the next quarterly reporting period. If the analytical data from a sampling event indicate that the performance standards used to determine the effectiveness of the remedy have been exceeded, the USEPA and the Illinois EPA will be notified in writing of the exceedence as soon as the exceedence has been recognized, but no later than within 45 days of the sampling event. The quarterly reports may be combined with quarterly O&M reports. An annual report, described below, will be submitted in lieu of a fourth quarter report within a given monitoring year. The quarterly reports will summarize sampling and analysis activities, and transmit environmental monitoring data collected during the quarter. Quarterly reports will be replaced by less frequent reports if the USEPA approves a monitoring frequency of less than quarterly. Specifically, the quarterly reports will include the following:

- Summaries of all activities sampling and analysis performed during the reporting period
- Summaries of any problems encountered during the reporting period, and actions being taken to rectify those problems
- Projected work for the next reporting period
- Copies of reports generated during the course of the reporting period, including, but not limited to, inspection reports and laboratory and monitoring data

7.2 Annual Reports

An annual summary report for a given monitoring year will be submitted to the USEPA and the Illinois Environmental Protection Agency (IEPA) by the end of the second month following the start of the next monitoring year. The report will provide an interpretation of the quarterly groundwater, surface water, leachate, and landfill gas monitoring results for the previous year, including construction of water table and potentiometric surface maps, where appropriate, and an assessment of the effectiveness of natural attenuation, which is the selected remedy for groundwater.

In addition, a summary of the Village of Antioch municipal well pumping scheme will be provided in the report, noting any significant changes from the previous year and/or planned changes in the following year.

Possible actions to evaluate the change may include: (1) collecting additional surface water samples or adding chemical constituents to the surface water monitoring program, (2) evaluating other surface water contribution sources between upstream and downstream monitoring locations, or (3) evaluating landfill conditions along the portions of the site that border Sequoit Creek. If the evaluation suggests that surface water is impacted by leachate from the H.O.D. Landfill, upstream and downstream surface water samples will be analyzed for TCL VOCs and TCL SVOCs during the next surface water sampling event. These data will be used to determine if additional VOC and SVOC sampling is warranted. If, after the additional monitoring and evaluation, it is determined that surface water is being negatively impacted by leachate from the H.O.D. Landfill, an evaluation will be made as to whether other response action (e.g., lowering of leachate extraction pumps in the vicinity, additional extraction points, monitored natural attenuation, etc.) would be appropriate. Any changes to the monitoring program or further response actions to evaluate an exceedence or need for corrective action will be made in consultation with the USEPA.

8.4 Leachate Collection System

8.4.1 Leachate System Performance Assessment

The primary objectives of the LCS (as stated on page 5 of the Statement of Work from the April 14, 1999, Unilateral Administrative Order) are to (1) increase leachate collection efficiencies, (2) reduce leachate levels throughout the landfill to eliminate seeps, and (3) induce an inward gradient condition from the shallow sand aquifer in the vicinity of the site. For each quarterly monitoring period, the following will be reported:

- Volume of leachate pumped from the site
- Leachate quality data
- Leachate head level measurements

On an annual basis, the following information will be reported:

- Summary of annual pumping volumes with a comparison to estimated volumes
- Summary of leachate head level data with a comparison to anticipated leachate head level reductions across the site
- Summary of the groundwater elevations in the shallow sand aquifer in the vicinity of the site with a comparison to leachate head level data within the landfill waste limits

consultation with the USEPA. A sample calculation set is included as Attachment A to this PSVP.

The performance standard of achieving leachate drawdown levels will be reviewed on an annual basis with performance milestones set for 3, 6, 9, and 12 years after the initial 3-month startup period. Results of the drawdown evaluation will be included with the annual reports. If leachate drawdown is significantly behind the predicted drawdown levels at the performance milestones, or if it is apparent that the 12-year leachate drawdown performance standard may not be achieved, an assessment of possible response actions will be initiated.

Criteria to be considered as part of the assessment for determining if an inward gradient will be achieved in an acceptable time frame will include items such as the following:

- A comparison of the actual groundwater levels to leachate head levels during the same time period
- Preparing an Isopach map of the liquid levels within the landfill that indicated the amount of change over a given time period
- Identification of isolated areas of the landfill which are ahead of, or behind, the predicted leachate drawdown time periods
- Identification of physical constraints that may be limiting the achievement of an inward gradient in certain areas of the site
- Comparison of actual drawdown notes to the predicted drawdown model
- Comparison of the quantity of liquid removed from the landfill to the resulting drawdown levels in the landfill

Any necessary ~~the scope of any~~ modifications to the leachate extraction system deemed necessary, based on the evaluation, will be determined in consultation with the USEPA.

8.4.2.4 Exceedence of POTW Leachate Levels

Waste Management, Inc., intends to maintain agreements and permits with multiple Publicly-Owned Treatment Works (POTWs) for treatment of landfill leachate from the H.O.D. Landfill. Having multiple leachate disposal outlets will provide WMII with flexibility in managing this liquid. Acceptance of leachate into these POTWs is subject to the terms of these permits. Shipments of leachate from the H.O.D. Landfill to off-site POTWs to date have not

presented operating problems to the receiving POTWs. Considering the age of the waste, the length of time for which WMII has been extracting leachate from the site, and the implementation of improvements to the leachate management system as part of the RA, future exceedences of discharge criteria are not expected. However, the tracking of variations in leachate quality and compliance with permitted limits will be part of the monitoring requirements established by the POTWs. Should pretreatment of the site's leachate become necessary prior to off-site discharge, WMII will develop and implement the necessary measures. WMII will keep the USEPA apprised of such developments, and provide information on any actions taken.

8.5 Landfill Gas Collection System

8.5.1 Landfill Gas Data Assessment

Monitoring data collected on the gas extraction system within the limits of waste and from the perimeter gas probes and ambient air monitoring locations will be used to evaluate the performance of the system. The results from monitoring the LFG extraction system will be compared with historical system performance. Perimeter gas probe and ambient air monitoring results will be compared with regulatory standards. If the results of the landfill gas monitoring indicate the LFG collection and management system is not controlling migration of landfill gas, the necessary steps will be taken to correct the performance of the system. Operation and maintenance adjustments to the LFG management system may be adequate to address potential isolated incidents of gas migration if they are detected.

8.5.2 Determination of Need for Contingent Action

If off-site methane levels persist after all possible operational adjustments to the system have been made, increased monitoring and/or modifications to the LFG extraction system will be evaluated. Any such modification to the LFG monitoring program or significant modification to the LFG extraction system will be made following consultation with the USEPA.

8.6 Landfill Cover and Fencing

8.6.1 Landfill Cover System

The final cover system provides a containment layer over the waste mass, a low-permeability ~~barrier~~ layer to reduce ~~the~~ infiltration of precipitation into the waste mass,

Section 9
References

RMT, Inc. 2000a. Predesign investigation results - groundwater. H.O.D. Landfill site. Village of Antioch, Lake County, Illinois. May 19, 2000.~~Groundwater PDI report. In review.~~

RMT, Inc. 2000b. Remedial design report, H.O.D. Landfill Site. May 2000.

RMT, Inc. 2000c. H.O.D. Landfill remedial design leachate drawdown time frame calculation set. July 21, 2000.

United States Environmental Protection Agency (USEPA). 1999a. Use of monitored natural attenuation at Superfund, RCRA corrective action, and underground storage tank site. OSWER Directive 9200.4-17P. April 1999.

United States Environmental Protection Agency (USEPA). 1999b. Environmental data management network (ED MAN) system support. Region 5 electronic deliverable. PPA-VR951/N0357. December 1999.

United States Environmental Protection Agency (USEPA). 2000. H.O.D. Landfill Superfund Site: Antioch, Illinois; final design approval. Letter from Ron Murawski (USEPA) to Larry Buechel (WMII). August 9, 2000.